Editorial

Training in an ultra-high-volume center

Firas Abu Akar[1,2,3], **Diego Gonzalez-Rivas**[1,4]

[1]Department of Thoracic Surgery, Shanghai Pulmonary Hospital, Tongji University School of Medicine, Shanghai 200433, China; [2]Department of Cardiothoracic Surgery, Shaare Zedek Medical Center (SZMC), Jerusalem, Israel; [3]Department of Cardiothoracic Surgery, Makassed Charitable Society Hospital, East Jerusalem, Israel; [4]Department of Thoracic Surgery, Coruña University Hospital, Coruña, Spain

Correspondence to: Firas Abu Akar. Department of Cardiothoracic Surgery, Shaare Zedek Medical Center, 12 Shmuel Bait St., PO Box 3235, Jerusalem 9103102, Israel. Email: firasabuakar@gmail.com.

Received: 26 January 2018; Accepted: 27 March 2018; Published: 29 April 2018.
doi: 10.21037/vats.2018.04.04
View this article at: http://dx.doi.org/10.21037/vats.2018.04.04

Introduction

"The person who says it cannot be done should not interrupt the person doing it"—Chinese proverb.

This article may be a documentary about an exiting personal experience, rather than being a scientific article. Still, I hope it will be beneficial and hope that you will like it.

Since publishing of the first uniportal video-assisted thoracoscopic surgery (VATS) anatomical lobectomy in 2011 which considered the launch of this technology (1). Many publications have subsequently been followed to demonstrate the applicability of the technique to other more complex procedures (2-4). Meanwhile, the technology of uniportal VATS has started to spread around the world in a short time, and surgeons begin to learn and adopt the technology (5-7). In addition to being less invasive than any other previous approach, perhaps the most important reason for this rapid and widespread spread of uniportal VATS related to its geometrical properties, which largely mimic open surgery, making it easier for surgeons who are inexperienced in VATS to switch from traditional open surgery directly to the uniportal VATS (8,9). This, in addition to the great efforts, exerted to spread the technology and teach it through the publication of textbooks and research, conferences, workshops and courses for the dissemination of the technique and teaching it to the thoracic surgeons around the world (10-13). Uniportal VATS technology was introduced to China in 2012 when Mr. Diego Gonzalez-Rivas was invited to visit Shanghai Pulmonary Hospital (SPH) to teach his new technique (*Figure 1*). Surgeons in SPH get thrilled to learn this exciting type of surgeries. Since then and in a very short period, many of them have started to adopt technology and activate it in most of their operations. The ambition did not stop at that point. Collaboration between SPH and Dr. Gonzalez-Rivas after that began in order to organize one of the most successful surgical training courses in the history of thoracic surgery in that hospital (13,14). When we mention SPH today, the reader should be aware that we are talking about a hospital with the largest department of pulmonary surgery throughout the world, and to give the reader a small appendage, it is a department that contains more than three hundred beds, sixteen surgical teams on top of each of them, there is a team leader professor or assistant professor (*Figure 2*). Each team includes several specialists, residents, and trainees. The operating rooms open in the morning to start work in twelve rooms at the same time. The hard work continues all day until the list of operations that may arrive for some days to more than eighty operations on the same day is over. This means that some rooms may finish work late at night. Or shortly before the beginning of the next day. The next day, the work is started again vigorously and tirelessly. More than 10,000 surgical procedures were performed in 2016 "which is a fanciful number in European and American standards" (*Figure 3*), 90% of which were performed by minimally invasive techniques, while more than 60% were performed through uniportal VATS approach "which include intercostal, subxiphoid and subcostal approaches." This super-high score has already crashed in the following year [2017], which may exceed the number of 13,000 operations with an increase in the percentage of the uniportal VATS operations compared to the previous year. This is in addition to the many international and local medical conferences, which started to be organized annually by the hospital. These events attract the biggest and most famous Chinese and international names in thoracic surgery around the world (*Figure 4*).

Figure 1 Teaching uniportal VATS by Dr. Gonzalez-Rivas for the first time in China [2012].

Figure 2 Surgeons team in Shanghai Pulmonary Hospital.

Figure 3 A photograph of the celebration of performing 10,000 operations at the hospital by the end of the year "2016".

Figure 4 Some photos from the fifth Uniportal VATS symposium which has been organized by Shanghai Pulmonary Hospital in 2017.

Figure 5 Teaching uniportal VATS by Dr. Gonzalez-Rivas for the first time in Jerusalem 2013.

Figure 6 Pictures During the first uniportal VATS training course in Shanghai Pulmonary Hospital (October 2014).

Discussion

Pre-training

No doubt working or training in such a place is a sweet dream for any thoracic surgeon. In addition to the relationships and friendships that can be built by meeting surgeons and practitioners within the field from all over the world, it is the ideal place where the novice surgeon can become an independent and competent surgeon in a short period of time. After learning the basic principles of uniportal VATS from Dr. Gonzalez-Rivas by visiting his operating room in Coruña 2013, he was invited to visit our department in Jerusalem to perform the first cases of Uniportal VATS lobectomies in our country (*Figure 5*). After that, we adopted the approach immediately and started to conduct most of our simple procedure such as pneumothorax and wedge resection through the uniportal technique as a routine in our unit (6,15). Then, as every beginner in uniportal VATS, I tried to refine my surgical skills by attending courses and workshops dedicated to teaching uniportal VATS. One of the most important courses was the first uniportal VATS training course which has been held at SPH in 2014 (*Figure 6*). This training has resulted in my ability to start performing uniportal VATS lobectomies (6). In our unit, two surgeons together were performing less than 150 surgical procedures annually while the percentage anatomical resection cases didn't exceed 15% of the total cases (which means less than 20 cases per year).

Although the passion for this new technique was great, the skills were developing relatively slowly due to lack of practice and the scarcity of cases in our low-volume unit. For these reasons, it was clear for me that intense training in a large, high-volume unit was necessary. As far as I know, there was a no more ideal place than "SPH" to practice this type of surgical training. So I started to communicate with the hospital and applied to come to Shanghai for a long period of training. Fortunately, my application was accepted without delay.

Training period

Since arriving at the airport, I have started a journey of learning and enjoyable adventure, which lasted for ten months and cannot be erased from my memory. Usually, the first phase of training in the surgical profession is that the fellow becomes engaged in a lot of daily routine work, such as receiving patients, examining them before and after the surgeries, and following their laboratory tests. This was not the case in Shanghai. The language barrier may make this even impossible, especially since the Chinese language is not a language that can be learned in a short period. Therefore, it was obviously useless to have a non-Chinese speaker fellow outside the operating room, although it was a strange situation for me, this may make the training period more interesting and profitable from the practical side. The time that the fellow may consume a time elsewhere in

Table 1 Changes in the operative time needed for performing a right upper lobectomy during the training period

Operative time (min)	Minimum	Maximum	Average
Surgical time for RUL lobectomy in the 2nd month	110	188	152
Surgical time for RUL lobectomy in the 4th month	55	120	87
Surgical time for RUL lobectomy in the 10th month	26	95	52

Figure 7 Dissecting and dividing the pulmonary vein during RUL lobectomy by a fellow trainee during the early stage of training (19). RUL, right upper lobe.
Available online: http://www.asvide.com/article/view/24384

dealing with papers and meet the daily needs of the ward, the foreign fellow in SPH can employ most of his day's hours by roaming between the operating rooms, whether to carry out operations, assisting in others, or even to move between the rooms in order to watch other operations, which are conducted continuously throughout the day in the 12 operating rooms. After all, in most days the trainee can find time to study and work on research and articles (4,6,16-18). In fact, the first few weeks, was a period of acquaintance, knowing the place and the people and a testing of the basic capabilities, before the trainee begins to take the reins of many operations every day. In the beginning, this happens under the supervision of the team leader to which the trainee belongs and soon the trainee turns himself into a supervisor for the newer trainees. Thanks to the huge numbers of the daily cases and liberality of the supervisors, the trainee in SPH gains a lot of experience and skills in few months, which may require several years to acquire elsewhere in Europe or in the US.

To examine the technical progress and speed of development of the trainee's skills and learning curve, we took 5 samples for simple uniportal VATS right upper lobectomies operations performed by the same fellow in the second month of training and compared it with 5 other operations in the fourth month of training and then another 5 from the 10th month of training (after the trainee had performed more than 150 anatomical resection procedures with the technology of uniportal VATS) (*Table 1*). We found that the average time needed by the same trainee to conduct a simple uniportal VATS right upper lobe (RUL) lobectomy in the second month of training was 152 minutes. It was reduced to 87 minutes in the fourth month of training; then dropped to 52 minutes at the end of the training (at the tenth month of training). Thanks to a large number of cases again, the team leader can gradually rise in terms of the difficulty of the cases chosen to be performed by the trainee, in the beginning, he may choose the easy cases such as cases of small ground glass opacities (GGOs), free of adhesions and well-developed fissure. Then move with him to the more difficult cases such as segmentectomies and then bigger tumors and challenging cases. In this way, the trainee acquires experience and self-confidence gradually and in a proper manner. As previously mentioned; in the first cases, the trainee needs more time to conduct the procedure, where the dissection is slow and is not very precise, which may cause a bloody and unclean surgical field (*Figure 7*) In contrast high, professionally dissection and the cleanliness of the surgical field can be noticed in the advanced stages of training (*Figure 8*).

Self-confidence is important to be possessed by every mature surgeon, this advantage it is an outcome of learning and the experience that comes with practice. One of the features of training in a high-volume department is that the trainee feels safe all the time. Even if a certain error or complications are not desirable, such as "pulmonary artery injury during surgery", very high—quality experts are always there to intervene quickly to address these cases quickly and professionally. Most cases of bleeding are treated by VATS without having to convert to thoracotomy and with keeping the patient's life in absolute safety (*Figures 9*). At some point, the trainee becomes able to deal with most

Figure 8 Dissecting and dividing the pulmonary vein during RUL lobectomy by a fellow trainee during the advanced stage of training (20). RUL, right upper lobe.
Available online: http://www.asvide.com/article/view/24385

Figure 9 Bleeding control and pulmonary artery repair performed by expert surgeon (21).
Available online: http://www.asvide.com/article/view/24386

Figure 10 Bleeding control and pulmonary artery repair performed by fellow surgeon (22).
Available online: http://www.asvide.com/article/view/24387

of these complications on his own (*Figure 10*). Subxiphoid and subcostal approaches are new promising modalities of uniportal VATS; these new techniques are very useful, especially for approaching the anterior mediastinum and bilateral surgeries (23,24). Because of the difficulty of these techniques, they are still practiced in very few centers around the world.

Those who would like to learn this technique should have experience in the intercostal approach first and have fully mastered it (23,24). Perhaps the golden opportunity to learn these techniques are in the same period of training in the same center and after controlling the intercostal method. The uniportal VATS course at the Shanghai Hospital, which organized by Dr. Gonzalez-Rivas and Dr. Timothy Yang almost every 2 months, attracts dozens of surgeons annually from different countries around the world. From the point of view of the fellow, the acquaintance of this number of surgeons, friendships that he earns during these courses may last over many years, and of course it is beneficial to him on the personal and professional level in addition to the opportunity offered by these courses for the trainee to train surgeons and guide them during the courses and wet labs (25). In addition to all of the above, it is natural for a hospital of this size to be a leader in the world in organizing local and international conferences and meetings in the field of thoracic surgery, and of course this opens the opportunity for trainees to be part of these events, which adds to the experience more benefit and excitement.

Conclusions

A surgical practice in an ultra-high-volume center may be very beneficial to the surgeon, In addition to shortening the time to transform the surgeon from a beginner to a professional with absolute safety, there are many advantages that the trainee may benefit from, such as availability of materials and time to write articles and research, and the formation of important relationships.

Acknowledgments

Funding: None.

Footnote

Provenance and Peer Review: This article was commissioned by the Guest Editors (Marco Scarci and Roberto Crisci)

for the series "VATS Special Issue dedicated to the 4th international VATS Symposium 2017" published in *Video-Assisted Thoracic Surgery*. The article did not undergo external peer review.

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at http://dx.doi.org/10.21037/vats.2018.04.04). The series "VATS Special Issue dedicated to the 4th international VATS Symposium 2017" was commissioned by the editorial office without any funding or sponsorship. DGR serves as an unpaid editorial board member of *Video-Assisted Thoracic Surgery* from Jul 2016 to May 2019. The authors have no other conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

References

1. Gonzalez D, Delgado M, Paradela M, et al. Uni-incisional video-assisted thoracoscopic left lower lobectomy in a patient with an incomplete fissure. Innovations (Phila) 2011;6:45-7.
2. Gonzalez-Rivas D, de la Torre M, Fernandez R, et al. Video: Single-incision video-assisted thoracoscopic right pneumonectomy. Surg Endosc 2012;26:2078-9.
3. Gonzalez-Rivas D, Yang Y, Stupnik T, et al. Uniportal video-assisted thoracoscopic bronchovascular, tracheal and carinal sleeve resections. Eur J Cardiothorac Surg 2016;49 Suppl 1:i6-16.
4. Abu Akar F, Yang C, Lin L, et al. Intra-pericardial double sleeve uniportal video-assisted thoracoscopic surgery left upper lobectomy. J Vis Surg 2017;3:51.
5. Ismail M, Helmig M, Swierzy M, et al. Uniportal VATS: the first German experience. J Thorac Dis 2014;6:S650-5.
6. Abu Akar F, Gonzalez-Rivas D, Ismail M, et al. Uniportal video-assisted thoracic surgery: the Middle East experience. J Thorac Dis 2017;9:871-7.
7. Fan J, Yao J, Wang Q, et al. Safety and feasibility of uniportal video-assisted thoracoscopic surgery for locally advanced non-small cell lung cancer. J Thorac Dis 2016;8:3543-50.
8. Bertolaccini L, Rocco G, Viti A, et al. Geometrical characteristics of uniportal VATS. J Thorac Dis 2013;5 Suppl 3:S214-6.
9. Aragón J, Pérez Méndez I. From open surgery to uniportal VATS: asturias experience. J Thorac Dis 2014 Oct;6(Suppl 6):S644-9.
10. Gonzalez-Rivas D. Uniportal video-assisted thoracic surgery. Ann Cardiothorac Surg 2016;5:75.
11. Eckland K. East meets West at Shanghai conference on single port surgery. Available online: http://www.examiner.com/article/east-meets-west-at-shanghai-conference-on-single-port-surgery
12. Sihoe AD. The evolution of minimally invasive thoracic surgery: implications for the practice of uni- portal thoracoscopic surgery. J Thorac Dis 2014;6:S604-17.
13. Sandri A, Sihoe AD, Salati M, et al. Training in Uniportal Video-Assisted Thoracic Surgery. Thorac Surg Clin 2017;27:417-23.
14. Available online: https://thoracics.org/2015/03/16/welcome-to-shanghai-pulmonary-hospital/
15. Abu Akar F, Gonzalez-Rivas D, Fink D. Management of bleeding from an abnormally located S6 arterial branch in a common origin with S2 branch during live surgery. J Vis Surg 2016;2:87.
16. Abu Akar FE, Yang C, Zhou Y, et al. Unusual case of subxiphoid uniportal VATS right upper lobectomy in a patient with interrupted inferior vena cava with azygous continuation. J Vis Surg 2017 26;3:92.
17. Zhao X, Abu Akar F, Song J, et al. Thoracoscopic tracheal resection and reconstruction using two ports approach. J Vis Surg 2017;3:19.
18. Abu Akar FE, Zheng H, Ali G, et al. Bilateral uniportal video-assisted thoracoscopic lung resections. Interact Cardiovasc Thorac Surg 2017;25:1012-3.
19. Abu Akar F, Gonzalez-RivasD. Dissecting and dividing the pulmonary vein during RUL lobectomy by a fellow trainee during the early stage of training. Asvide 2018;5:419. Available online: http://www.asvide.com/article/view/24384
20. Abu Akar F, Gonzalez-Rivas D. Dissecting and dividing the pulmonary vein during RUL lobectomy by a fellow

trainee during the advanced stage of training. Asvide 2018;5:420. Available online: http://www.asvide.com/article/view/24385
21. Abu Akar F, Gonzalez-Rivas D. Bleeding control and pulmonary artery repair performed by expert surgeon. Asvide 2018;5:421. Available online: http://www.asvide.com/article/view/24386
22. Abu Akar F, Gonzalez-Rivas D. Bleeding control and pulmonary artery repair performed by fellow surgeon. Asvide 2018;5:422. Available online: http://www.asvide.com/article/view/24387
23. Hernandez-Arenas LA, Lin L, Yang Y, et al. Initial experience in uniportal subxiphoid video-assisted thoracoscopic surgery for major lung resections. Eur J Cardiothorac Surg 2016;50:1060-6.
24. Akar FA. Subxiphoid Uniportal Approach is it Just a Trend or the Future of VATS. MOJ Surg 2017;4:00076.
25. Available online: https://vimeo.com/214646413

doi: 10.21037/vats.2018.04.04
Cite this article as: Abu Akar F, Gonzalez-Rivas D. Training in an ultra-high-volume center. Video-assist Thorac Surg 2018;3:17.

